

reform I have suggested is unaffected by such criticism. The practical training I have advocated, whether founded on object-lessons furnished by the Field, the Workshop, or the Home, would prove the most suitable for developing the child's intelligence and aptitudes and for enabling him to derive the utmost advantage from attendance at any one of the different types of secondary schools best fitted for his ascertained abilities and knowledge. The bent of the child's intellect would be fully determined before the age when the earliest specialisation would be desirable. No scheme of instruction for primary schools can be regarded as satisfactory which is not so arranged that, whilst providing the most suitable teaching for children who perforce must enter some wage-earning pursuit at the age of fourteen, or at the close of their elementary school course, shall at the same time afford a sound and satisfactory basis on which secondary and higher education may be built. And I hold the opinion, in which I am sure all teachers will concur, that a scheme of primary education pervaded by the spirit of the Kindergarten which, by practical exercises, encourages observation and develops the reasoning faculties, and creates in the pupil an understanding of the use of books, would form a fitting foundation for either a literary or a scientific training in a secondary school.

I have purposely chosen to illustrate the main subject of this address by reference to defects in our primary instruction, because the success of our entire system of education will be found, year by year, to depend more and more upon the results of the training given in our public elementary schools. We have scarcely yet begun to realise the social and political effects of the momentous changes in our national life, consequent on the first steps which were taken less than forty years ago to provide full facilities under State control and local management for the education of the people.

At present all sorts of ideas are afloat which have to be carefully and scientifically considered. The working classes have to be further and somewhat differently educated, in order that they may better understand their own wants and how they are to be satisfied. We have placed vast powers in the hands of local bodies, popularly elected, powers not only of administration, for which they are well adapted, but powers of determining to a very great extent, by the free use of the rates, the kind of instruction to be given in our schools, and the qualifications of the teachers to impart it. Moreover, these local bodies have shown, in many instances, a distrust of expert advice and a desire to act independently as elected representatives of the people, which cannot fail for some time at least to lead to waste of effort and of means. It was said years ago, when the centre of our political forces received a marked displacement, that we must educate our masters. Our masters now, both in politics and education, are the people, and it is only, I believe, by improving their education that we can enable them to understand the essential difficulties of the problems which they are expected to solve, and can induce them to rely, to a greater extent than they do at present, on the results of the application to such problems of scientific method, founded on the fullest information obtainable from historical and contemporary sources.

I might have illustrated my subject by reference to the acknowledged chaotic condition of our secondary education. In the report of the Board of Education published in December last we read: "While the development of secondary education is the most important question of the present day, and is the pivot of the whole education as it affects the efficiency, intelligence, and well-being of the nation, yet its present position may be described as 'chaos.'" The "chaos" by which the present position of our secondary education is here described is intimately connected with the questions relating to primary education, which I have been engaged in considering. If we construct a system of primary education which serves equally for children of all classes, apart from social conditions—a system educationally sound, both as a preparation for immediate wage-earning pursuits and for more advanced and somewhat more specialised training in a secondary school—many of the difficulties which confront the Board of Education, and which are largely of an

administrative order, would disappear. The difficulties are in part dependent on the question of curriculum, to the discussion of which a day will be devoted during the present meeting.

University education in this country, and indeed in other countries, has also suffered much from the hands of the unscientific reformer. In Germany, owing to many causes, the higher education has made considerable advances during the past century; but, even in that country, a more critical study of the development of University education and a truer recognition of the twofold function of a University might have prevented the early separation in distinct institutions and under separate regulations of the higher technical from University instruction. Only within recent years has France retraced her steps and returned to the University ideal of seven centuries ago. But perhaps the climax of unscientific thinking was reached in the scheme, happily abandoned, of founding a new University in Dublin on the lines suggested by Mr. Bryce in his now famous speech of January last.

Our conception of the functions of a University has undergone many violent changes. Between the ideal of the University of London prior to its reorganisation and that of a mediæval University, in which students were never plucked, obtaining their degrees whether they did their work well or badly, there have been many variations; but I think it may be said that, recently at any rate, we have come to realise the fact that our Universities, to fulfil their great purpose, must be schools for the preparation of students for the discharge of the higher duties of citizenship and professional life, and Institutions for the prosecution of research, with a view to the promotion of learning in all its branches, and that examinations for degrees, necessary, as they undoubtedly are, as tests of the extent of a student's acquired knowledge, must be regarded as subordinate to these two great functions.

I will not detain you longer. I have endeavoured to show under what limitations education may lay claim to be included among the sciences, and how a knowledge of the history of education and the application of the methods of scientific inquiry may help in enabling us to solve many of the intricate and complicated questions which are involved in the establishment on a firm foundation of a national system of education. I have taken my illustrations mainly from the reform of elementary, or, as I prefer to call it, primary education, and I have sought to indicate some of the errors into which we may fall when we fail to apply to the consideration of the problem the same principles of inductive inquiry as are employed in all investigations for the attainment of Truth.

I believe that this Section of the British Association has the opportunity of rendering a great service to the State. Numerous educational societies exist, in which questions of importance are discussed, and all, perhaps, do useful work. But none is so detached from separate and special interests; none stands so essentially apart from all political considerations; none is so competent to discuss educational problems from the purely scientific standpoint as are the members of this Association. If, in the remarks I have offered, somewhat hastily prepared under the pressure of many different kinds of work, I have contributed anything to the solution of a problem the difficulty and national importance of which all will admit, I shall feel that I have not been altogether unworthy of the honour of occupying this Chair.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

LIVERPOOL.—Mr. Percy E. Newbury has been appointed professor of Egyptology in the University.

LONDON.—University College:—With the assistance of the Chadwick trustees, arrangements have been completed to hold a new course on school hygiene, including lectures, demonstrations, and practical work, beginning on October 16. The course will be given by Mr. Henry Kenwood and Dr. H. Meredith Richards. It is designed to meet the requirements of school teachers, school lecturers, and those qualifying to become school inspectors and school medical officers. A certificate of proficiency will be granted to those who qualify themselves.

A programme of the courses of study in the departments of pure and applied mathematics and astronomy of University College, London, has just been issued. In it are to be found full particulars as to the courses in the departments for students preparing for honours in the subjects above referred to, also of the facilities for research in the college. The programme may be obtained on application to the secretary of the college.

OXFORD.—Owing to the great increase in the number of students at Ruskin College, the staff is being increased. Prof. J. E. Smith has retired from the position of vice-principal, and has been elected director of studies and chairman of the executive committee. He will for the present combine this with his duties in the newly created chair of economics and public administration at University College, Bristol, and with his work at the London School of Economics. Mr. Charles S. Buxton, of Balliol College, has been appointed vice-principal. Mr. H. S. Furniss, of Hertford College, has been appointed lecturer in economics. The plans for the new building are now under consideration. The building will be erected on the site of the temporary buildings adjoining Worcester College, and will accommodate 100 students. For this purpose the college will require about 20,000l.

A FURTHER 2000l. has been given by Sir Donald Currie towards the equipment fund of Queen's College, Belfast, bringing up his contributions to the sum of 22,000l.

THE calendar of the Merchant Venturers' Technical College, Bristol, has just been issued, and gives particulars of the courses of instruction at the institution and much other information. Although the main building of the college was partially destroyed by fire, the work of the institution has not been crippled, owing to the Bristol Education Committee having placed at the disposal of the governors large buildings planned to accommodate more than 1000 pupils. These buildings, temporarily known as the Castle Branch of the Merchant Venturers' Technical College, Castle Green, have been fitted with the necessary lecture theatres, laboratories, and workshops.

AN amendment to the Education Administrative Provisions Bill, recommending that power should be given to local authorities to make periodic anthropometric records of children which would afford definite information as to the physical condition and development of the children, was moved last week in the House of Commons by Sir Philip Magnus, who referred to the resolution upon the subject adopted at the joint meeting of the Anthropological and Educational Sections of the British Association, and the report upon such measurements conducted by the Glasgow School Board, which has just been issued by the Scotch Education Department; but upon the President of the Board of Education saying that clause 13 of the Bill as it stands gives the necessary powers the amendment was not carried. It is well, perhaps, to emphasise the fact that local authorities possess under the new Act the necessary powers to institute a system of scientific measurements.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, August 12.—M. Bouquet de la Grye in the chair.—Integral curves of differential equations: Georges **Rémundus**.—The accidents arising during the manipulation of compressed oxygen, and on an arrangement permitting of their avoidance: Georges **Claude**.—The ordinary forms of regulator for reducing the pressure contain a piece of ebonite, and this is liable to catch fire and even to inflame the steel cylinder. The author describes a simple modification of the regulator by which any local elevation of temperature in the neighbourhood of the ebonite is avoided.—A dynamo designed for wireless telegraphy: P. **Villard**. This dynamo has been designed so that the voltage curve is analogous to that of a Ruhmkorff coil, and, in addition, allows the time interval between the successive sparks to be regulated mechanically. The nature of the voltage curve produced has been studied by means of the oscillograph, curves from which are reproduced in the paper. Experiments

have been made with this instrument both in the laboratory and in the field, and for equal motive power the results are much superior to those obtained with a coil. The dynamo is also useful for the production of X-rays.—The maximum of phosphorescence: J. **de Kowalski** and C. **Garnier**. A discussion of some recent results on the same subject by L. **Bruninghaus**.—The cause of the beating of the heart: H. **Kronecker**. Serum from the blood of a calf was subjected to diffusion in a current of flowing water so that the amount of sodium chloride was reduced to 0.6 per cent. This fluid was used to replace the blood in the cardiac cavities of the frog, toad, and tortoise, and it was found possible to suppress completely the beats of the heart for one hour. Any stimulus applied during this period of arrest caused either a strong pulsation or a group of pulsations. The effects of other solutions are also recorded. The conclusion is drawn from these experiments that the heart does not beat automatically, but requires stimulants of a chemical nature to act on the nervous plexus of the heart.—The reaction of tuberculin in leprosy (subcutaneous, dermic, and conjunctival inoculations): Charles **Nicollé**.—Observations on the Eocene and Oligocene in Hampshire: Jean **Boussac**.—The results of observations of the intensity of gravity at the island of Booth-Wandel, Grahamsland, by the Antarctic expedition of Dr. J. Charcot: M. **Matha**. An account is given of the experimental method used and the accuracy attained. The value of g found, 982.439, is higher than the value calculated from the formula of Deforges, $g = 978.106 (1 - 0.005243 \sin^2 A)$, by 0.116 cm. This difference is in full accord with the results of Foster in the same regions.—The paroxysms of Stromboli: A. **Riccò**.

CONTENTS.

	PAGE
Applied Optics. By Edwin Edser	409
A Theory of the Æther	410
Foundry Practice	411
Our Book Shelf:—	
Kingsley: "Eversley Gardens and Others"	412
Martin: "The Friendly Stars."—W. E. R.	412
Cameron: "On the Evolution of Wound-treatment during the Last Forty Years"	413
Wake: "Vortex Philosophy: or the Geometry of Science Diagrammatically Illustrated"	413
Letters to the Editor:—	
The August Draconids—Perseid Fireballs.—W. F. Denning	413
The Heating of a Balloon Wire by Lightning.—E. Gold	413
The Origin of the Domestic Striped Tabby Cat.—R. I. Pocock	414
A Fossil Tsetse-fly in Colorado.—Prof. T. D. A. Cockerell	414
Physics and Chemistry. By Sir Oliver Lodge, F.R.S.	414
A Triad of Sporting Books. (Illustrated.) By R. L. Genetics	415
Notes	417
Our Astronomical Column:—	
Daniel's Comet, 1907d	422
Search-Ephemerides for Comets 1894 IV. and 1900 III.	422
Mars	422
The Total Eclipse of January, 1908	422
The Leeds Astronomical Society	422
The Making of Mountains. By G. A. J. C.	423
The South African Association	424
International Marine Investigations	425
The Transvaal Department of Agriculture	425
The Arc and the Spark in Radio-Telegraphy. By W. Duddell, F.R.S.	426
The British Association:—	
Section K.—Botany.—Opening Address by Prof. J. B. Farmer, M.A., F.R.S., President of the Section	430
Section L.—Educational Science.—Opening Address by Sir Philip Magnus, B.Sc., B.A., M.P., President of the Section	439
University and Educational Intelligence	439
Societies and Academies	440